

Building on the Success of LEED

Laboratories for the 21st Century creates rating system for lab-specific setting

By PAUL A. MATHEW, PHD • Lawrence Berkeley National Laboratory • Washington, D.C.

The growing demand for medical cures, advanced products and systems, and world-class research and development has increased the demand for high-performance laboratories. However, it can be quite a challenge to meet aggressive energy-efficiency and sustainability goals when designing these specialized facilities. Designers must grapple with the inherent complexity of laboratory systems, unique health and safety requirements, high energy-use intensity, and a range of environmental impacts. In fact, the typical laboratory is about three to five times as energy-intensive as a typical office building and costs about three times as much per unit area.

The Laboratories for the 21st Century (Labs21) program is working to address these issues, with a focus on improving the environmental performance of public- and private-sector laboratory buildings. Co-sponsored by the Environmental Protection Agency (EPA) and the Department of Energy (DOE), Labs21 conducts training, provides technical assistance, and develops tools for sustainable laboratory design (www.labs21century.gov).

GUIDELINES TAILORED TO LABORATORY DESIGN

The Labs21 Environmental Performance Criteria (EPC) is a rating system for use by laboratory building-project stakeholders to assess the environmental performance of laboratory facilities. The

EPC leverages and builds on the U.S. Green Building Council's (USGBC's) widely used Leadership in Energy and Environmental Design (LEED) rating system.

Labs21 developed the EPC in response to a desire by laboratory designers to have a rating system similar to LEED, but tailored to the unique characteristics of laboratory facilities. It was developed with the expertise of more than 40 volunteers, including laboratory architects, engineers, and health and safety personnel. The EPC modifies some of the LEED credit requirements and adds several new credits and prerequisites in areas not addressed by LEED.

Some of the laboratory-specific prerequisites and credits added to the EPC include:

Sustainable sites

- Using physical and computational modeling to assess and reduce the impact of air effluents.
- Preventing the release of hazardous materials to sanitary sewers using containment and engineering controls.

Water efficiency

- Eliminating the use of potable water for open-loop cooling of laboratory equipment.
- Documenting and reducing process-water use and process-waste-water generation.

Energy and atmosphere

- Selecting an optimal minimum ventilation rate considering user needs, health and safety protection, and energy consumption.
- Reducing energy consumption through the use of energy-efficient laboratory systems and equipment, such as high-performance fume hoods, energy-recovery devices, and low-pressure drop-ventilation-system design.
- Using efficient on-site energy-generation systems to reduce source energy use.
- Using energy-efficient laboratory equipment, such as refrigerators and freezers.
- Right-sizing mechanical equipment by improving estimates of heat gain from laboratory equipment.

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Materials and Resources

- Implementing a chemical-resource management plan to reduce and manage laboratory chemical supplies.

Indoor Environmental Quality

- Using computational fluid dynamics to optimize indoor airflow for contaminant containment.
- Conducting fume-hood commissioning per American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Standard 110.

LEED ADDS TO FUNDAMENTALS

The EPC has been used on many projects by more than a dozen organizations, including pharmaceutical companies, federal agencies, colleges, and universities. In fact, the EPC recently was incorporated into the University of California Regents' policy on sustainable design.

The success of the EPC encouraged the USGBC to develop a LEED Application Guide for Laboratories (LEED-AGL), which is under development. LEED-AGL uses the EPC as a starting point.

It is anticipated that most of the EPC requirements will be incorporated into LEED-AGL. LEED-AGL is expected to be completed in late 2005.

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